pared by W. J. Peters of the Carnegie Institution of Washington and B. Weinberg of the Central Geophysical Observatory of Leningrad should be published by the Union of Socialist Soviet Republics, if possible, before the polar year.

15. The commission regards the following mountain stations desirable for the execution of the meteorological program: 2 on the west coast, 1 near the southern coast, 2 on the east coast, and 1 on the northeastern coast of Greenland; 2 on Iceland; 1 on Jan Mayen Island; 1 on the Faroe Islands; 2 in Norway; 1 in Spitzbergen; 1 on the Kola Peninsula at Chibiny; 1 at Matochin Shar; 1 in Franz Josef Land; 1 at Boulbouh (Verkhoyansk Mountains); and 1 near Bering Strait.

16. For the execution of the aerological program, five stations around the Arctic are desired and it is recommended that one each be established in Alaska, in Canada, in Greenland, in Spitzbergen, and in the Union of Socialist Soviet Republic.

17. The countries interested in the polar year are requested to arrange for pilot-balloon stations on board as well as for the careful training of the personnel of "selected ships" for aerological and meteorological investigations at sea.

18. It is recommended that the program of investigation of the upper layers of the atmosphere submitted by Professor Moltschanow for the study of the temperature-gradient should be supported by the Union of Socialist Soviet Republics, if in any way possible, with the necessary means.

19. The publication in the protocol of the conference was authorized of Prof. A. Kaminsky's communication on investigation of climate in polar regions with recommendation that his proposition be considered especially in regard to establishing observing stations.

20. Having received the report Hydrological investigations in the period of the International Polar Year and the detailed program in hydrology proposed by the institutions of the Union of Socialist Soviet Republics, the commission considers that program important both from the economic viewpoint and the viewpoint of geophysical science, and directs that these documents be submitted to the subcommittee created to consider the questions of exploring the sea during the polar year.

21. The report from the permanent actinometric commission of the hydrometeorological committee of the Union of Socialist Soviet Republics submitted by Prof. M. N. Kalitin on the organization of the actinometric work during the polar year was accepted with thanks and authority given to publish it in the protocol of the conference.

22. The commission on the higher atmosphere, the commission on clouds, and other international commissions are asked to decide upon and to communicate one year before the beginning of the polar year those dates selected for particular programs of observation, in order that they may be included appropriately in the program of the polar year.

Special committees, which were requested to make their reports by the end of 1930, were appointed to consider and prepare reports upon questions relative to standard equipment, to methods of observing and recording, and to publication. The members of the committees are: Publication, Messrs. Simpson, Sverdrup, and Maurain; magnetic instruments, Messrs. Fleming, la Cour, and Keränen; meterological instruments, Messrs, Simpson and Sverdrup; aerological instruments, Messrs. Hergesell and Wangenheim; actinometric instruments, Messrs. Wangenheim and Dominik; atmospheric-electric instruments, Messrs, Maurain, Hergesell, and la Cour; earth-current instruments, Mr. Fleming; instruments for auroral observation, Messrs. Maurain, la Cour, and Keränen.

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CLIMATOLOGICAL CHARTS FOR THE ALLEGHENY FOREST REGION

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There is a great use for climatological charts in forest research. One of the most frequent uses of such charts is in the study of distribution of forest types and individual tree species. The foundation for the study of the influence of climate on vegetation has been laid by Merriam, Abbe, Livingston, Shreve, among others, and serves as an excellent basis for a more elaborate investigation of any particular region. Bates, at the Lake States Forest Experiment Station, has found that Norway pine in the Lake States, whence comes the bulk of the seed used for artificial reforestation with this species, grows under mean summer temperatures varying only from 56° to 66° F. This is very important from the silvicultural point of view because it has been learned in Sweden that if the variation of the mean summer temperature of a planting site differs by so much as 1° C. (1.8° F.) from that of the seed source, results may be only 65 per cent as good as if home-grown seed had been used. According to Bates, traffic lanes for seed will ultimately be laid along isothermal lines.

Climatological charts of a scale large enough to be useful in regional or local studies are generally available only for the several States. But vegetation recognizes few political boundaries and the Federal forest experiment stations are organized so far as possible on a regional basis. When, therefore, the Allegheny Forest Experiment Station recently undertook to compile charts of precipitation, temperature, and other climatic factors, it was confronted with the task of placing on a single map data from four different States—Delaware, Maryland, New Jersey, and Pennsylvania.

As a result of an inquiry sent to the Weather Bureau section directors of the States concerned and the adjoining States, it was learned that but few charts were available. Virginia and West Virginia had none. The charts procured are listed in Table 1. Summaries "of the climatological data for the United States" were received for all the States.

[1] Acknowledgment: Mr. George S. Bliss, section director, U. S. Weather Bureau, Philadelphia, Pa., gave many helpful suggestions which were followed in the preparation and revision of the charts.

TABLE 1

State	Temperature isotherm interval	Precipitation isohyetal line interval	Growing season days	Frost dates [1]
Delaware	Average annual 1°	Average annual, 2 and 4 inches	Exact average for counties	Exact average for counties.
Maryland	do	do	do	Do.
New Jersey [2]	Mean annual, 1° Mean summer, 1° Mean winter, 1°	Mean annual, 2 inches Mean summer, 2 inches Mean winter, 2 inches	None	None.
New York	Mean annual, 2°	Normal annual, 5 inches	do	Do.
Ohio [3]	Normal annual, 1° Normal monthly, 1°	Normal annual, 3 inches	15-day intervals	5-day intervals.
Pennsylvania [4]	Normal annual, 2° Normal monthly, 2°	Normal annual, 5 inches	do	15-day intervals.

[1] Average date of first killing frost in the spring and average date of last killing frost in the fall.
[2] From the Annual Report of the State Geologist, New Jersey, 1899.
[3] From Alexander, W. H., 1923. A Climatological History of Ohio, Ohio State University. This also included charts for normal monthly distribution of precipitation, and annual snowfall.
[4] From charts furnished by George S. Bliss, section director, at Philadelphia. Charts of normal annual snowfall and normal monthly snowfall were also procured for Pennsylvania.

TABLE 2

Climatic factor	Beech-Birch-Maple [1]	Entire region
Average annual temperature	44° to 49° F.	44 ° to 57° F.
Average dates of last killing frost in spring	4-20 to 6-10 [1]	4-10 to 6-10.
Average dates of first killing frost in fall	9-10 to 10-30 [1]	9-10 to 11-10.
Average length of growing season, days	120 to 165 days	120 to 224 days.
Average summer temperature (June to September, inclusive).	63° to 68° F.	65° to 75° F.
Mean minimum summer temperature (June to September, inclusive).	53° to 55° F. [2]	53° to 67° F.
Mean maximum summer temperature (June to September, inclusive).	74° to 79°F. [2]	74 ° to 85° F.
Average annual precipitation	38 to 50 inches	34 to 50 inches.
Mean summer precipitation (June to September, inclusive).	14 to 19 inches	14 to 20 inches.

[1] General. Few exceptions as noted under factor under consideration. Cities such as Erie and Scranton may have some effect.
[2] Except Scranton (57°) and Erie (60°).
[3] Local variations in Alleghenies to 82°, local climate may vary from that shown on our small scale chart.

Several difficulties arose when an attempt was made to combine the State charts into a regional one. The isotherms and isohyetal lines for one State often failed to connect with the corresponding climatic line in the adjoining State. The base maps of the States were on different scales, and the intervals between the various climatic lines differed. The New Jersey charts were old and did not correspond with the averages of 1920. These differences made it necessary to compile our own regional charts from the data available.

Averages obtained from the summaries "of the climatological data for the United States" were plotted on a large scale map of the region. Average rather than normal values are charted. The distinction between "average" and "normal" is, according to Milham, that average is the "sum of a number of observation divided by the number of observations. If the observations have been extended over a sufficient length of time so that accidental irregularities have been eliminated by taking the average, then the average value may be spoken of as a normal." Where great irregularities were observed, as in some of the shorter records, the data were compared and weighed with data from nearby stations having longer records, according to the method of Reed and Kincer.[1] Topography was used as a guide to the charting of the climatic lines in the mountainous regions. No contour map on a suitable scale was available for the region.

Temperature, precipitation, growing season, and frost charts have been prepared to date, and are presented herewith. The dearth of available drought, humidity, and evaporation data has made it impossible to make charts for these factors.

Several interesting correlations between climate and vegetation have been made with the charts so far prepared. Through the courtesy of the Pennsylvania Department of Forests and Waters [2] a large scale map of the "Beech-birch-maple" type in Pennsylvania was obtained, and the climate of the type as worked out from our charts is given in Table 2.

From the rather sketchy species distribution maps of the Forest Service it has been observed that the southern limit of chestnut oak in Maryland and Delaware practically coincides with the northern limit of loblolly pine. The dividing line roughly follows the 72° average summer isotherm, the 62° mean minimum summer isotherm, and the 82° mean maximum summer isotherm. The average summer precipitation is from 16 to 17 inches. There seems to be no relationship between this dividing line and average annual temperature, average annual precipitation, frost, or growing season, although all of these factors, either singly or collectively, may affect the distribution. Evaporation, humidity, drought, and winter temperature probably play an important part in limiting the northward occurrence of the pine and the southern occurrence of the oak. Loblolly pine has been reported as occurring naturally in Cape May County, but nowhere else in New Jersey. The State forest service, however, has had success in planting loblolly pine in southern New Jersey. That soil is not the chief limiting factor in the distribution of the loblolly pine in New Jersey, is apparent from a study of the soil bulletin for Maryland and New Jersey. Soil types which in New Jersey contain no loblolly pine, have a luxuriant growth of this species in southern Maryland. Unless undetermined chemical or biological differences within the same soil type, in the two States, limit distribution, climate must be the chief limiting factor.

A real knowledge of the climatic conditions of a region, conveniently recorded in the form of charts, is valuable in many less obvious connections. Thus, the fact that cities have an effect upon average temperature, has been revealed in the Allegheny region by our temperature, frost, and growing season charts, and raises a question as to the wisdom of making phenological observations in city parks, a practice at one time considered by the experiment station.

[1] Reed, W. G., and Kincer, J. B., 1917. The Preparation of Precipitation Charts. Mo. Weather Rev. Vol. 45, pp. 233-235.

[2] Illick, Joseph S., and Frontz, Leroy, 1928. The Beech-Birch-Maple Type. Pennsylvania Department of Forests and Waters. Bull. 46.

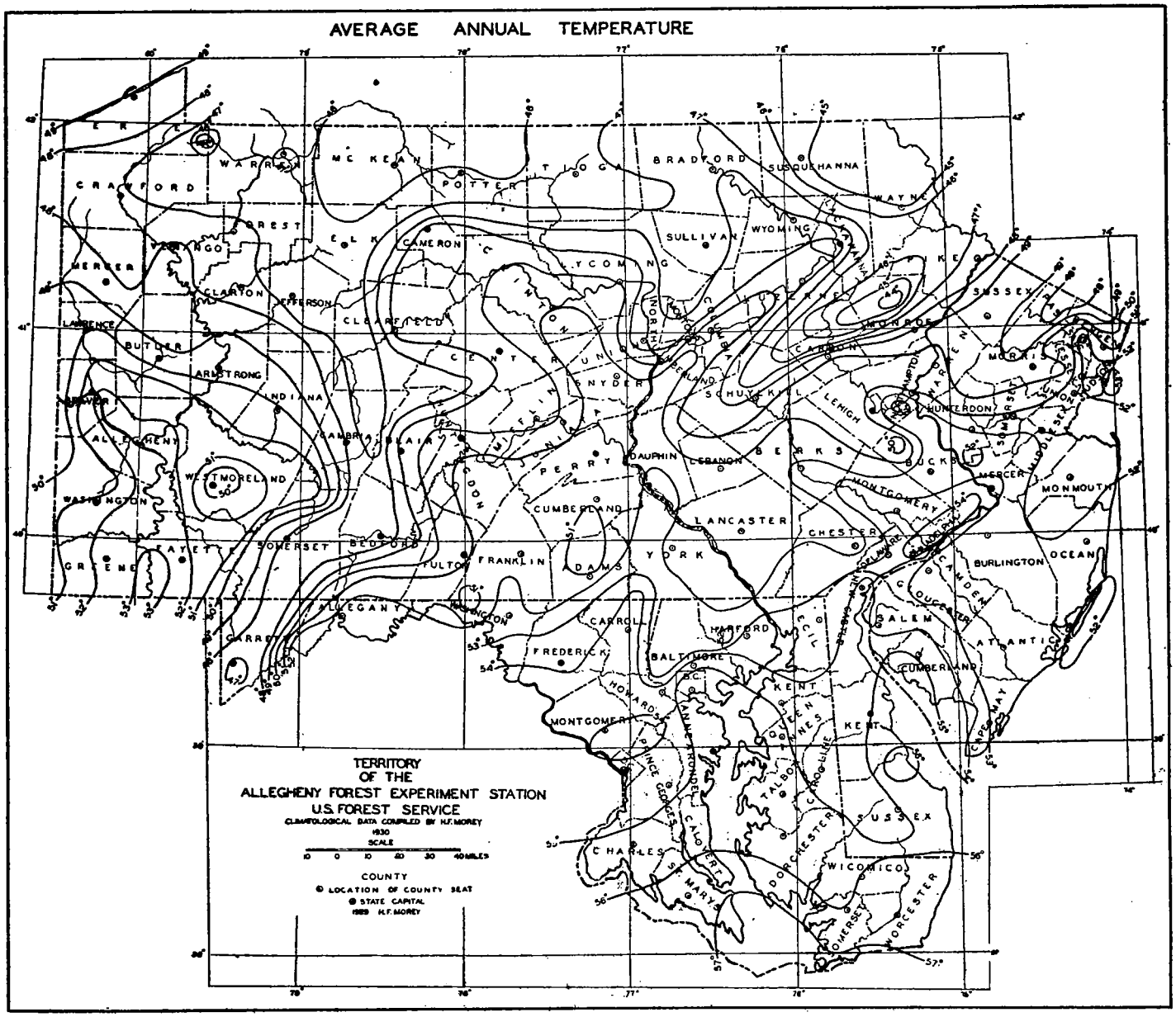

FIGURE 1.—Average annual temperature

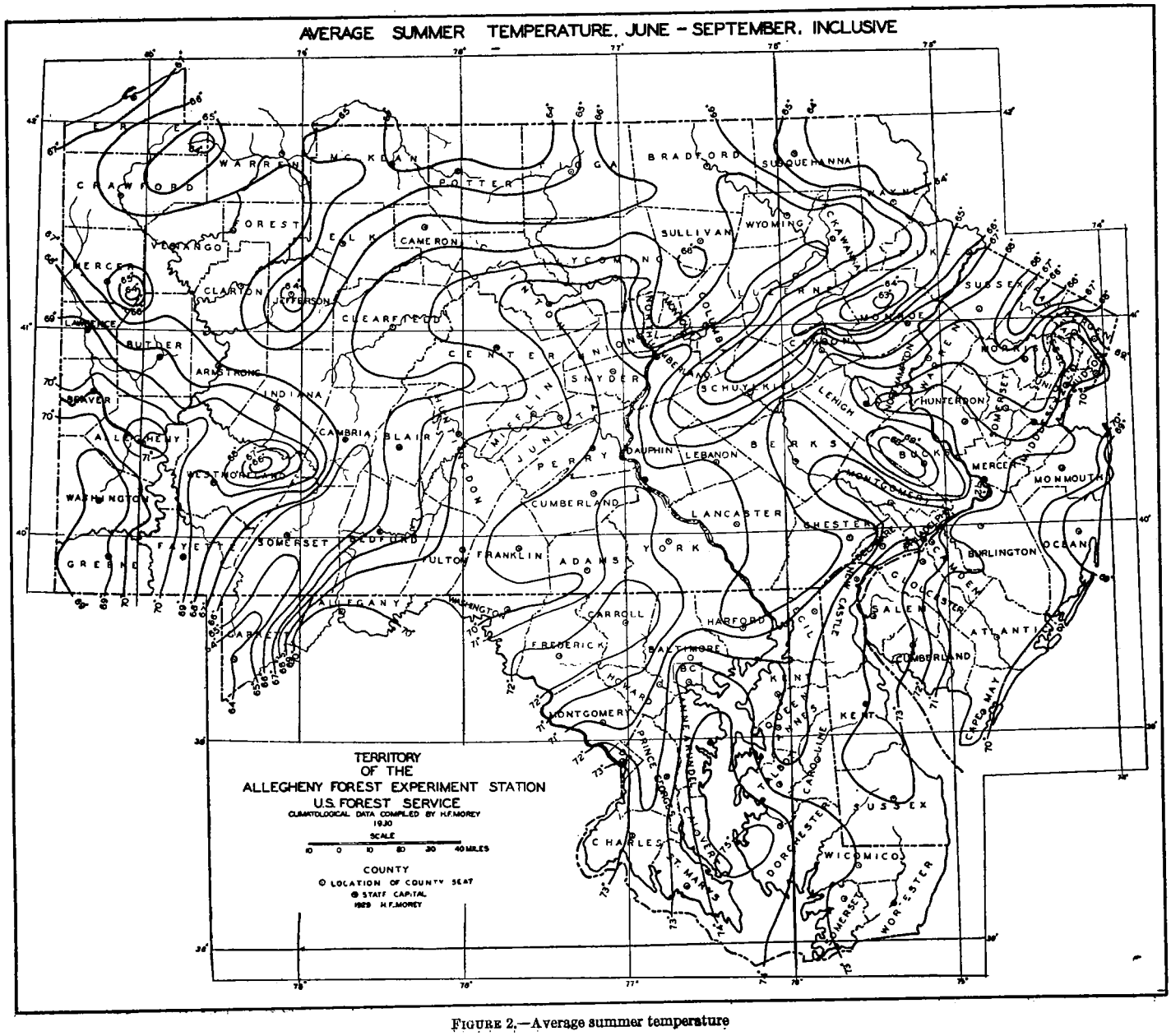

FIGURE 2.—Average summer temperature

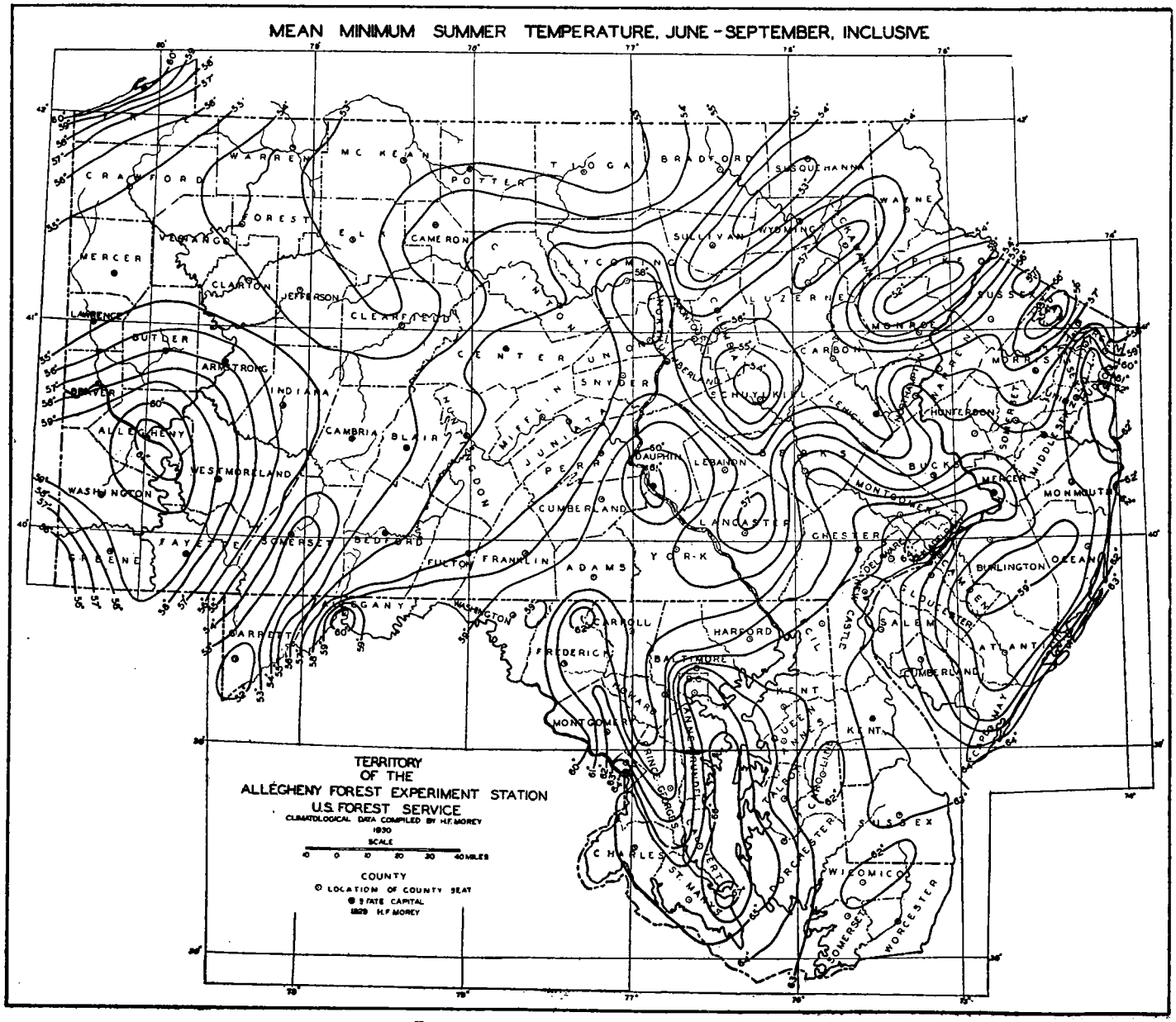

FIGURE 3.—Average summer minimum temperature

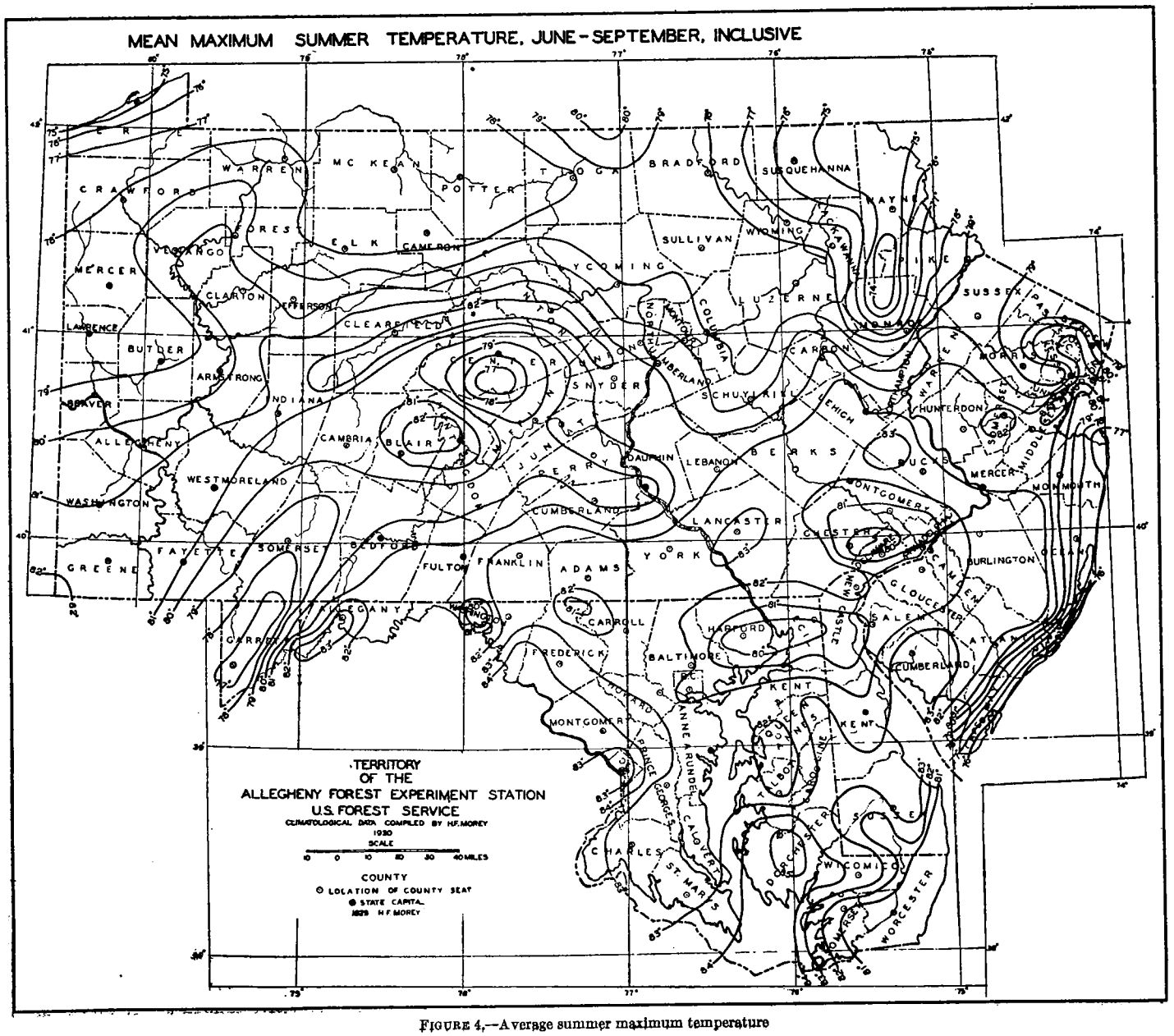

FIGURE 4.—Average summer maximum temperature

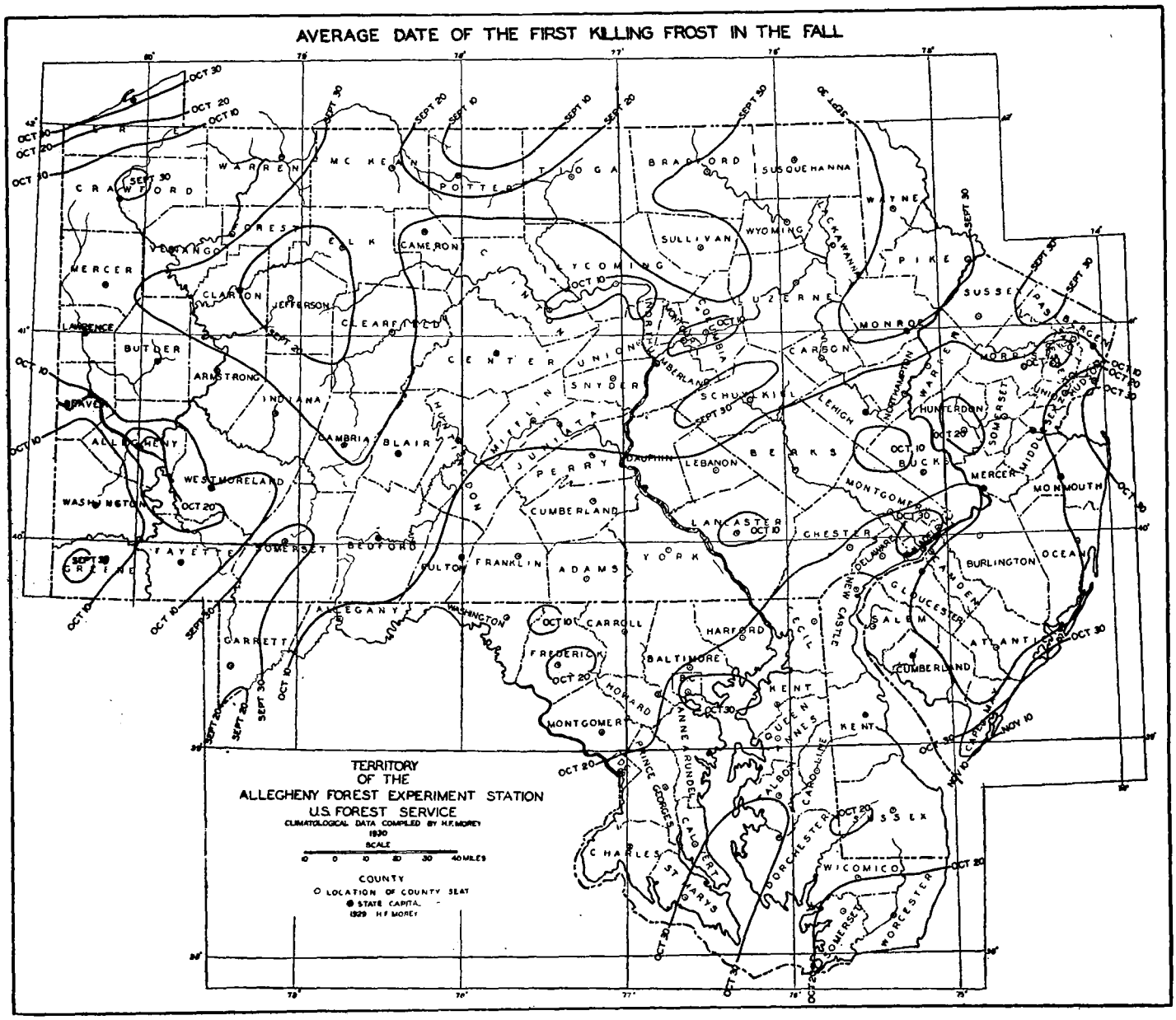

FIGURE 5.—Average date of first killing frost in fall

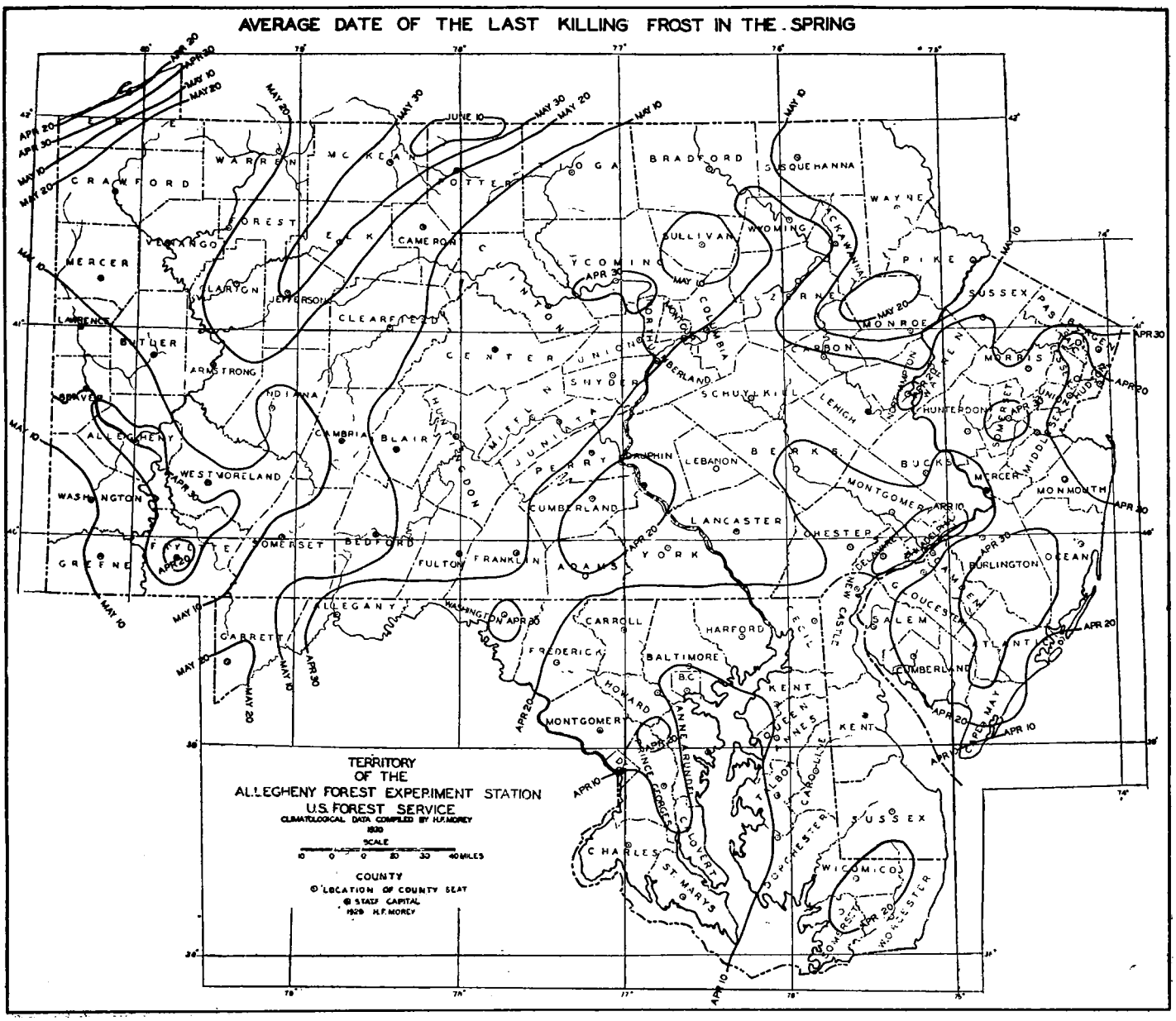

FIGURE 6.—Average date of last killing frost in spring

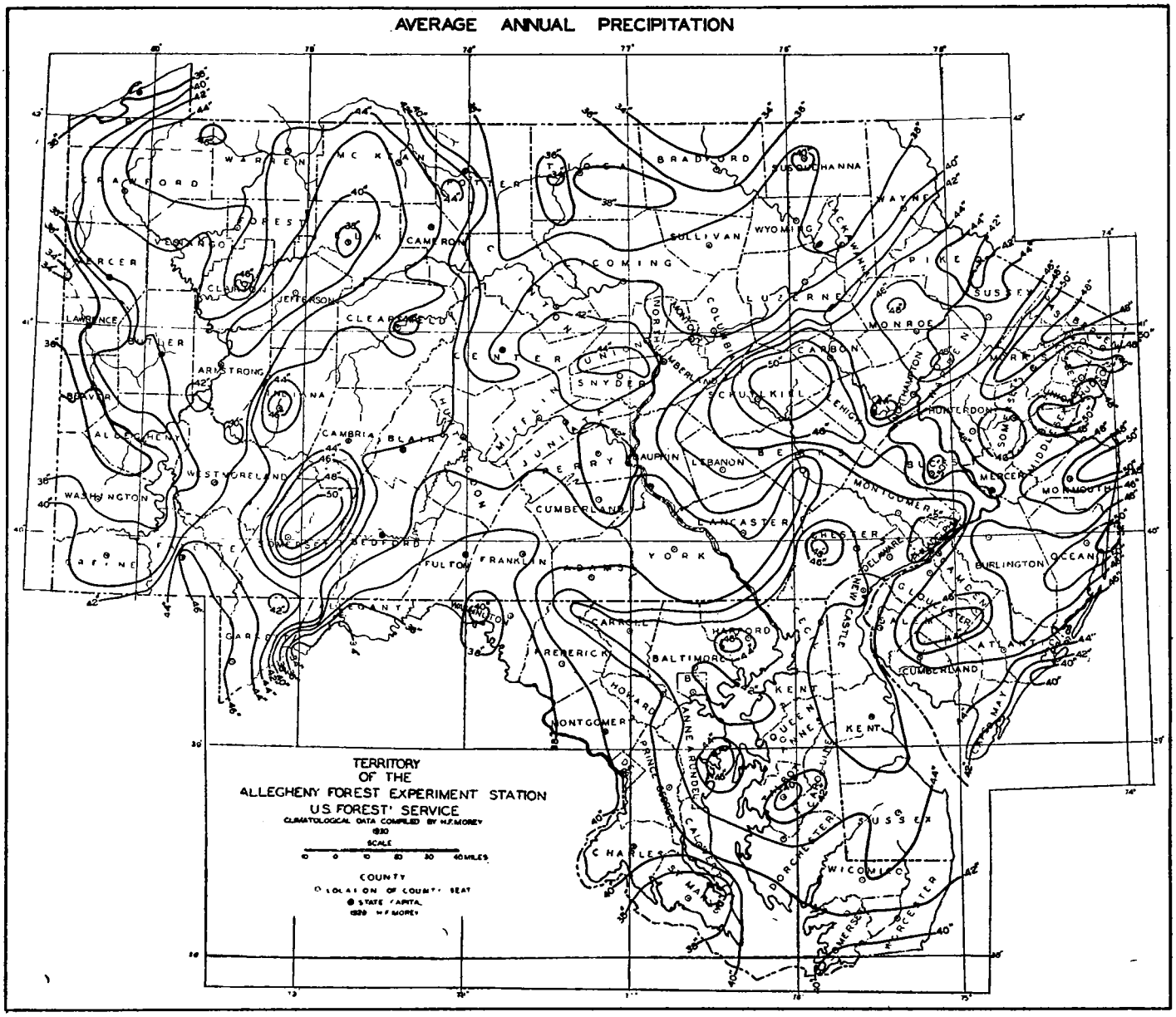

FIGURE 7.—Average annual precipitation

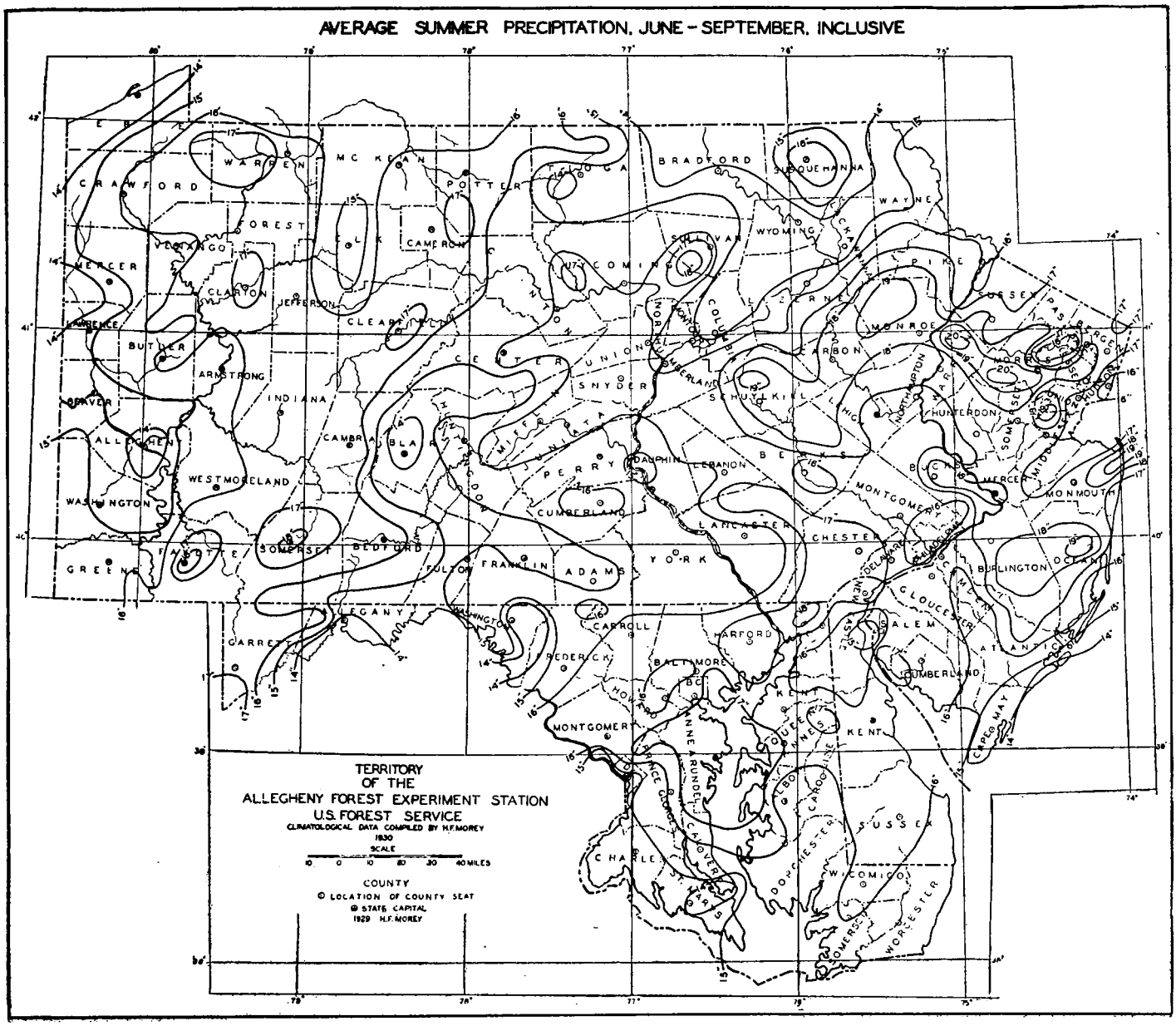

FIGURE 8.—Average summer precipitation

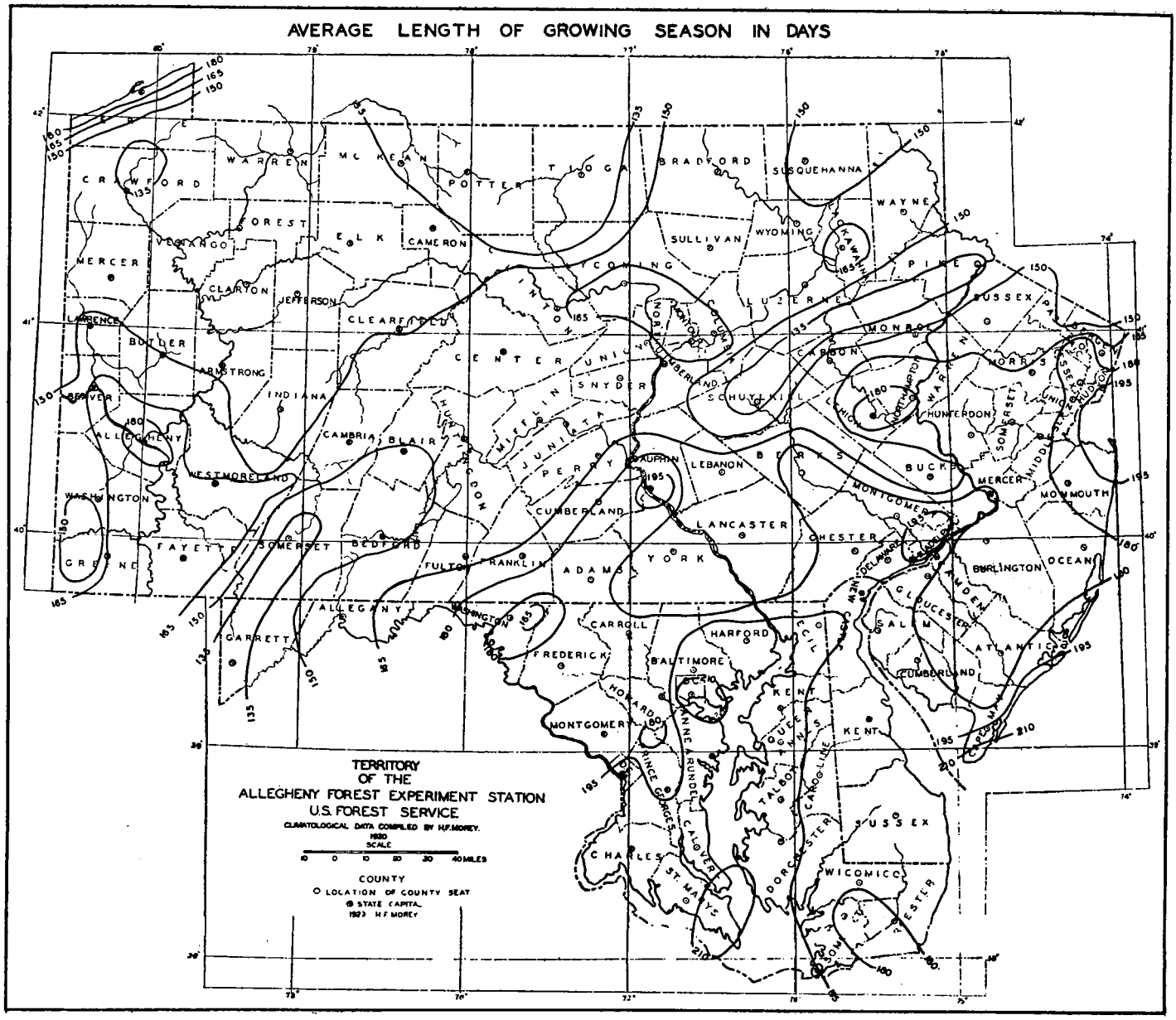

FIGURE 9.—Average length of growing season